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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/659,725

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Montaz N. Mansour

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WOMBLE CARLYLE SANDRIDGE & RICE, PLLC

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MERKLING, MATTHEW J

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/659,725	<b>Applicant(s)</b> MANSOUR ET AL.	
	<b>Examiner</b> MATTHEW J. MERKLING	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 33-38, 41-43, 45, 94-103, 105-110 and 115-120 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 33-38, 41-43, 45, 94-103, 105-110 and 115-120 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 33-37, 41-43, 45, 94-99, 101-103 and 105-109 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Mansour (US 5,306,481) and Atwell (US 2,680,065).

**Regarding claims 33, 34, 94, 95, 101 and 106** Monacelli discloses a process for producing a product gas having heat or fuel value (see abstract) comprising:

feeding a carbonaceous material to a fluidized bed (black liquor, via conduit 12, see Fig. 3, abstract), the fluidized bed containing particles suspended in a fluid medium (such as sodium carbonate, col. 4, lines 58-60), the fluidized bed including a top portion (top half of fluidized bed 54) and a bottom portion (bottom half of fluidized bed 54), the bottom portion being in communication with a solids collection reservoir (76) located below the bottom portion and separate from the fluidized bed (see Fig. 3 which illustrates that the solids collection reservoir is indeed separate from the fluidized bed, they do not occupy the same volume); and

feeding a gaseous medium through the solids collection reservoir (via conduits 2,3,4 and 5 comprising steam and an oxygen-containing gas, col. 6 lines 7-20) and into the

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bottom portion of the fluidized bed (see Fig. 3 where gas is introduced into the solids collection reservoir 76 and the pass up to act as the fluidizing medium for the fluidized bed 54), the gaseous medium comprising an oxygen-containing gas (col. 6 lines 52-59), wherein:

the solids collection reservoir is maintained at a higher temperature than the fluidized bed (col. 7 lines 17-24).

Monacelli does not explicitly disclose receiving bed solids from the fluidized bed directly into the solids collection reservoir. However, Monacelli does disclose the preference to increase the thermal efficiency of the reactor (see col. 7 lines 25-30). As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to directly add the bed solids from the fluidized bed into the solids reservoir in order to retain the heat that is contained by bed solids and avoid the need to reheat the bed solids once they are added to the solids collection reservoir.

Furthermore, Monacelli does not explicitly disclose the first fluidized bed containing a pulse combustion device.

Mansour also discloses a method and apparatus for gasifying carbonaceous materials (such as black liquor) in a fluidized bed (see abstract).

Mansour teaches resonant tubes (5) extending into a fluid-bed reactor (1) which are coupled to a pulse combustor (2) in order to provide a more efficient heat transfer mechanism between the combustion device and the fluidized bed (C11/L24-30).

It would have been obvious to one of ordinary skill in the art at the time of the invention to add the pulse combustor of Mansour to the combustion device/heat

exchanger of Monacelli as a way to improve the efficiency of the heat transfer between the combustion device and the fluidized bed.

Furthermore, Monacelli discloses the extracted bed solids are oxidized in the second fluidized bed (col. 7, lines 25-30), but does not explicitly disclose that a second portion of the extracted bed solids is endothermically converted to a gas in the second fluidized bed, to thereby form a second product gas stream.

Atwell also discloses producing a gas from a carbonaceous medium which has a heating value (see abstract).

Atwell teaches extracting partially reacted bed solids from a first fluidized bed (37) and directing them to a second fluidized bed (44) where they are oxidized to provide heat to the first fluidized bed (col. 5 lines 14-20). Atwell also discloses that some of the extracted bed solids from the first fluidized bed are endothermically gasified in the second fluidized bed in order to complete the gasification of the carbon material and produce a second product stream (col. 5 lines 14-40).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add the step of endothermically converting a second portion of the extracted bed solids in the second fluidized bed to produce a second product gas while still oxidizing a first portion of the extracted bed solids to provide heat to the first fluidized bed, as taught by Atwell, to the process of Monacelli (where a portion of the gas produced in the lower fluidized bed would be extracted as a product, while the other portion of the gas would be utilized as the fluidizing gas for the first fluidized bed) in

order to complete the gasification of the entrained bed solids while still producing a fluidizing gas for the first fluidized bed without needing an additional fluidizing medium.

**Regarding claims 35, 36, 97, 98, 107 and 108**, Monacelli discloses a process as defined in claims 33 and 94, wherein the fluidized bed is maintained at a temperature of less than about 1100 degrees F (col. 6, lines 20-25).

**Regarding claims 37, 99 and 109**, Monacelli discloses a process as defined in claims 33 and 94, wherein the first product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the fluidized bed (C4/L18-21).

**Regarding claims 41 and 102**, Monacelli discloses a process as defined in claims 33 and 94, wherein the carbonaceous material comprises black liquor (C4/L13).

**Regarding claims 42, 43, 45, 96, 103 and 105**, Monacelli discloses the particles suspended in the fluidized bed comprise sodium carbonate (col. 3 lines 27-38) and the fluidizing medium comprises steam (col. 2 lines 51-54), the carbonaceous material being fed to the fluidized bed comprising black liquor (see abstract), a majority of the black liquor being steam reformed in the fluidized bed.

While Monacelli does not explicitly disclose steam reforming of the black liquor, the claimed and prior art product(s) are identical or substantially identical, or are produced by identical or substantially identical process(es) the burden of proof is on applicant to establish that the prior art product(s) do not necessarily or inherently possess the characteristics of the instantly claimed product(s), see *In re Best*, 195 USPQ 430.

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3. Claims 33 and 94 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ashworth (US 4,097,361) in view of Mansour et al. (US 5,306,481).

**Regarding claim 33 and 94,** Ashworth discloses a process for producing a product gas having heat or fuel value (see abstract) comprising:

feeding a carbonaceous material (can process a variety of carbon containing fuels, see abstract) to a first fluidized bed (30), wherein the first fluidized bed containing particles suspended in a fluid medium (fluidized bed, see abstract, col. 3 lines 64-68);

at least a portion of the carbonaceous material being gasified to form a first product gas stream (inherently from pyrolysis/gasification occurring in fluidized bed 40);

extracting bed solids containing carbon (via conduit and valve 84) from the first fluidized bed and feeding the extracted solids to a second fluidized bed/solids collection reservoir (40, col. 12 lines 26-33) separate from the first fluidized bed (see Fig. 2), the second fluidized bed being at a temperature higher than the temperature of the first fluidized bed (see abstract), the second fluidized bed having a fluidizing medium comprising steam (via conduit 36, see Fig. 2) and an oxygen-containing gas (via conduit 141, see Fig. 2), wherein:

a first portion of the extracted bed solids is oxidized in the second fluidized bed and a second portion of the extracted bed solids is endothermically converted to a gas in the second fluidized bed, to thereby form a second product gas stream (see col. 7 lines 2-7 which discloses that partial oxidation occurs in gasification zone 40 in order to produce heat as well as low BTU fuel gas).

The method of Ashworth teaches utilizing heat from the partial combustion of char in second fluidized bed (40) as the sole source of heat required for the first fluidized bed (30, see abstract). As such, Ashworth does not teach a pulse combustion device which heats the first fluidized bed where an endothermic reaction takes place.

Mansour also discloses a method and apparatus for endothermically generating a fuel gas from carbonaceous materials in a fluidized bed (see abstract).

Mansour teaches resonant tubes (5) extending into a fluid-bed reactor (1) which are coupled to a pulse combustor (2) in order to provide a more efficient heat transfer mechanism between the combustion device and the fluidized bed (col. 11 lines 24-30).

As such, adding the pulse combustor of Mansour to the first fluidized bed of Ashworth would have been obvious to one of ordinary skill in the art at the time of the invention as a means to supplement the sole heat source for the endothermic reaction which takes place in the first fluidized bed with a highly efficient means to add heat.

Furthermore, such a modification would amount to nothing more than applying a known technique to a known device to yield predictable results.

Furthermore, Ashworth discloses the second fluidized bed (40) is heated by oxidizing carbon in the bed, and without an external heat source (via the exothermic combustion of char, as discussed above).

4. Claims 38, 100 and 110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Mansour (US 5,306,481) and Atwell (US 2,680,065) as applied to claims 33, 94 and 106 above, and further in view of Tanca (US 5,624,470).



**Regarding claims 38, 100 and 110**, modified Monacelli discloses all of the limitations of the process as defined in claims 19, 33, 94 and 106, and wherein the fluidizing medium fed to the second fluidized bed contains oxygen (C6/L52-60), but does not explicitly disclose in a stoichiometric amount of less than about 50% based on the amount of carbon in the bed.

Tanca discloses black liquor gasification carried out with oxygen in the range of 20-50% to result in gasification of more than 60-99% (C2/L26-45), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Monacelli to carry out the gasification reaction at stoichiometric amount of less than about 50% based on the amount of carbon in the bed for the desired resulting gasification products as such a modification is a result effective variable, where one skilled in the art would recognize to optimize a process variable by routine experimentation, for example in this case, control the results of the gas produced (Tanca, C2/L25-45). See In re Boesch, 617 F.2d 272, 276 (CCPA 1980); MPEP 2144.05.

5. Claims 115-117 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Mansour (US 5,306,481) and Atwell (US 2,680,065) as applied to claims 33, 94 and 106 and further in view of Ashworth (US 4,097,361).

**Regarding claims 115-117**, Monacelli discloses introducing steam into the solids collection reservoir (76) in order to heat the steam and assist in heating and the gasifying reaction that occurs in the fluidized bed. However, Monacelli does not explicitly disclose introducing steam directly into the fluidized bed to serve as the fluidizing agent.

Ashworth also discloses a method for obtaining a fuel gas from a carbonaceous material (see abstract).

Ashworth, like Monacelli, teaches breaking down a carbonaceous material into a product gas stream (in reactor 30) and sending solid material contained in reactor 30 to a second gasifier (40) or 'solids collection reservoir' and generating heat in the second gasifier which is in turn, returned to the first reactor (30) in order to assist in the endothermic reaction. Ashworth also discloses adding steam directly into the reactor (30), as a means to fluidize the initial gasification reaction (see Fig. 2).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to add steam directly into the fluidized bed of Monacelli, as taught by Ashworth, as such a modification would be nothing more than combining prior art elements according to known methods to yield predictable results.

6. Claims 118-120 are rejected under 35 U.S.C. 103(a) as being unpatentable over Monacelli et al. (US 5,752,994) in view of Mansour (US 5,306,481) and Atwell (US 2,680,065) as applied to claims 33, 94 and 106 above, and further in view of Frewer et al. (US 4,300,916).

**Regarding claims 118-120**, Monacelli teaches a solids collection reservoir where steam gasification takes place (due to the temperature and the presence of steam and carbonaceous material), however, Monacelli does not teach the solids collection reservoir is configured as a fixed bed.

Frewer also discloses a method for gasification of a carbonaceous material to produce a product synthesis gas (see abstract).

Frewer teaches that steam gasification is preferably operated as a fixed bed (as opposed to fluidized bed) which allows larger sized carbonaceous material to be static while steam is passed in contact with the solids and facilitates the steam gasification reaction (col. 4 lines 20-29).

As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to operate the solids collection reservoir of modified Monacelli as a fixed bed reactor (as taught by Frewer) in order to allow larger sized carbonaceous material to be static while steam is passed in contact with the solids and facilitates the steam gasification reaction.

### ***Response to Arguments***

7. Applicant's arguments submitted 8/21/09 have been fully considered but they are not persuasive.

On page 9, Applicant argues that the cited references do not contain the limitation that the solids collection reservoir is separate from the fluidized bed. The examiner respectfully disagrees with this argument. It is the examiner's position that the cited references do teach a separate solids collection reservoir as none of the references teach a solids collection reservoir which occupies the same space as the fluidized bed, therefore, they are separate.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./

Examiner, Art Unit 1795

/Jennifer K. Michener/

Supervisory Patent Examiner, Art Unit 1795